Mixing Solutions for the Muskat Problem

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The Muskat Problem describes the evolution of the interphase between two fluids evolving through a porous media. The theory is very different depending on whether the heavier or lighter fluid are in top of each other. The case of the heavier fluid on top is ill posed in Sobolev Spaces. In spite of that there is a number of results and numerical experiments showing the presence of a so called mixing zone, related to the phenomena of fingering. In this talk I will describe how a combination of convex integration and contour dynamics yields the existence of weak solutions for an arbitrary initial interphase.